

REMARKS

Claims 1, 3, 5, 7, 9, 11, 13, 15 and 17-21 are pending. Claims 1 and 17-21 have been amended herein. Support for the amendment is detailed below. Claims 2, 4, 6, 8, 10, 12, 14 and 16 have been cancelled without prejudice.

Applicants' Response to the Claim Rejection under 35 U.S.C. §102(e):

Claims 1, 3, 5 and 7 are rejected under 35 U.S.C. §102(e) as being anticipated by Tsai et al. (U.S.P. 7,067,235). In response thereto, applicants have amended claim 1 to more distinctly claim the subject matter regarded as the invention. Specifically, applicants have included the features that a first opening is formed in a first region and the organic resist film is formed over this first opening. Tsai does not teach these features of the present invention.

Amended claim 1 is applicable to the so-called dual damascene process in which via-holes are formed before the interconnection trenches are formed. In this case, the first opening corresponding to the via-hole and the second opening corresponds to the interconnection trench (see, e.g., FIGS. 1-5 of the present application). In the present invention, a mixed gas of nitrogen and oxygen gas is used for etching the organic film formed in the first opening. According to this feature of the present invention, the generation of cracks is prevented at the interface between the first opening and the organic film. Contrary, during the conventional process, when an organic film formed in the first opening is etched by using the conventional etching gas of e.g., NH_3 or N_2/H_2 , cracks are often formed therein (see FIGS. 6A-6C of the present application).

Tsai discloses a photoresist layer 20 developed with a dry development chemistry including nitrogen, oxygen and optionally argon as a carrier gas (see, e.g., FIG. 1C and column 6, line 61-column 7, line 1). However, Tsai neither teaches nor suggests the dual damascene process of the presently claimed invention. Tsai also neither teaches nor suggests that an organic film is formed in an opening etched with a mixed gas of nitrogen and oxygen gas. Further, Tsai does not recognize that cracks are caused at an interface between a first opening and an organic film formed therein during the etching of the organic film in a dual damascene process. Wherefore, Tsai does not teach each and every limitation of applicants' amended claim 1.

Claims 1, 3, 5 and 7 are rejected under 35 U.S.C. §102(e) as being anticipated by Lee et al. (U.S.P. 6,933,236). As noted above, applicants have amended claim 1 to more distinctly claim the subject matter regarded as the invention. Lee does not teach each and every limitation of amended claim 1. Lee discloses an organic anti-reflective coating layer 15 etched with an O₂/N₂ gas (see, e.g., FIGs. 1-2 and column 3, lines 57-67). However, Lee neither teaches nor suggests the dual damascene process of amended claim 1. Lee also neither teaches nor suggests that an organic film formed in an opening is etched with a mixed gas of nitrogen and oxygen gas. Further, Lee does not recognize that cracks are caused at the interface between the first opening and the organic film formed therein during the etching of the organic film in a dual damascene process.

Amendment Under 37 C.F.R. §1.111
Application No. 10/816,959
Attorney Docket No. 042324

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Michael J. Caridi", is written over the printed name.

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